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ACTUAL WEIGHT AND BALANCE REPORT  
BOILERPLATE STACK NO. 27

SECOND VEHICLE FOR DYNAMIC TESTS  
(NASA-CR-116676) ACTUAL WEIGHT AND BALANCE  
REPORT. BOILERPLATE STACK NO. 27, SECOND  
VEHICLE FOR DYNAMIC TESTS (North American  
Aviation, Inc.) 47 p

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Prepared By

Weight Control Group

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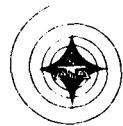
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SPACE and INFORMATION SYSTEMS DIVISION

SECTION I  
INTRODUCTION



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## ACTUAL WEIGHT AND BALANCE REPORT

FOR

BOILERPLATE STACK NO. 27

SECOND VEHICLE FOR DYNAMIC TESTS

### INTRODUCTION

The actual weight and balance determinations of Boilerplate Stack No. 27 Command Module and Service Module have been conducted by the Apollo Weight Control Group at the Space and Information Systems Division of North American Aviation, Inc. The weight and centers of gravity of the Command Module were obtained by weighing the module in two horizontal positions, rotating the module approximately  $86^{\circ} 30'$  counterclockwise about the X axis between the first and second positions. The Service Module weight and centers of gravity were obtained by weighing the module in the horizontal and vertical planes. No actual weight and balance determination has been made of the Launch Escape System due to the unavailability of a weight and balance fixture at this time. Weight and balance data for the Spacecraft LEM Adapter (SLA) is not available for the same reason. Therefore, LES and SLA weight and balance data is based on calculated values.

Attitudes of the module weighings along with the centers of gravity derived from each weighing are listed below:

ASSEMBLY	CENTER OF GRAVITY
Command Module (Horizontal-First Position)	X, Y and Z
Command Module (Horizontal-Second Position)	
Service Module (Horizontal)	X
Service Module (Vertical)	Y and Z

The weights and centers of gravity derived were obtained by the use of the Al4-154 Quotientiometer with the HL4-041 Revere load cells. No corrections are required to account for local "G" forces since the standard weights used for calibration are trimmed to the local "G" forces at the calibration station. Any additional corrections to account for "G" forces between the calibration station and Downey, California are negligible.

A weight monitoring program was used after the actual weighings of the Command Module and Service Module to account for changes made after the modules were weighed. The weights and centers of gravity of the items added and/or removed are itemized on the page following the Weight and Balance Calculation Sheets.

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The Weight, Center of Gravity and Inertia Summary, Page 3 and 4, presents the actual weights of the Command Module and Service Module and their centers of gravity based on the actual weighings. The Launch Escape System and the Spacecraft LEM Adapter weights and balance are based entirely on calculated values. The moments of inertia of all modules are also calculated values. Page 4 shows the ballast changes required for an LES of approximately 7,700 pound control weight.

Pages 5 through 16 present the derivation of the actual weights and centers of gravity of the Command Module and Service Module. Included are corrections made due to shortages at the time of weighing. The summary page for each of the two weighed components indicates the average of the two attitude weighings. This report will be reissued after the actual weights of the Launch Escape System and Spacecraft LEM Adapter have been obtained.

Pages 17 through 20 show a functional weight breakdown summary of the various modules. The Command Module and Service Module also show the weight for a manufacturing variation, indicating the weight required to make the book values agree with the actual weight.

Since the boilerplate stack is to be used for dynamic tests, a large percentage of the weight of the modules is in ballast units or simulated equipment items. These items are all removable in order to be able to simulate a great variety of loading conditions. Pages 21 through 27 present a list of all items that are removable on the LES, Command Module and Service Module, giving their weight and centers of gravity.

Pages 28 through 35 presents a series of weight distribution curves. Included are distributions for the Launch Escape System gross weight and LES ballast only; the Command Module gross weight; the Service Module gross weight (including full water ballast in the propellant tanks); Service Module weight empty (no water ballast in propellant tanks but including all other removable items); and the curves showing water ballast in one each of the SPS fuel and oxidizer tanks. The ballast water weight in the fuel tank is 8,617 pounds and in the oxidizer tank the weight is 10,862 pounds. These water ballast weights are based on a unit weight of 62.5 pounds per cubic foot. Irregularities at the beginning and end of the cylindrical section of the water ballast curves are due to the fact that the tangency of the curved bulkhead and cylindrical section does not occur at one of the five inches increments used in the distribution curves.

The dimensional diagram shows the Apollo Spacecraft X<sub>a</sub> stations which have an origin 998.7 inches aft of the tangency of the Command Module structure mold line. Also shown is the relation of the Apollo spacecraft and the Saturn Booster position.

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**SECTION II**  
**MASS DATA SUMMARY**



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MASS DATA SUMMARYWEIGHT, CENTER OF GRAVITY AND INERTIABOILERPLATE STACK NO. 27

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT. <sup>2</sup> )		
		X <sub>a</sub>	Y <sub>a</sub>	Z <sub>a</sub>	ROLL (X)	PITCH (Y)	YAW (Z)
COMMAND MODULE	10989	1043.2	0.7	5.3	6309	4579	4714
SERVICE MODULE	8143	912.0	0.8	-0.3	6605	8957	9069
SPACECRAFT LEM ADAPTER	3575	645.5	1.4	-3.0	8698	12211	12061
TOTAL LESS LAUNCH ESCAPE SYSTEM	22707	933.5	0.8	2.0	21667	119160	119203
LAUNCH ESCAPE SYSTEM - FULL BALLAST	7845	1319.2	0.0	0.0	254	13919	13921
TOTAL BOILERPLATE STACK NO. 27	30552	1032.6	0.6	1.5	21927	320263	320304

\*Centers of gravity are in the NASA reference system except that the longitudinal (X<sub>a</sub>) has an origin 998.7 inches below the Command Module structure mold line.

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MASS DATA SUMMARYWEIGHT, CENTER OF GRAVITY AND INERTIABOILERPLATE NO. 27

1. To obtain the LES control weight of approximately 7,700 pounds, the uppermost V15-30041-5 (one only) and V15-300411-7 (one only) ballast pieces are to be removed. This change provides an LES as shown below.

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENT OF INERTIA (SLUG-FT. <sup>2</sup> )		
		X <sub>a</sub>	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
LAUNCH ESCAPE SYSTEM (Full Ballast)	7845	1319.2	0.0	0.0	254	13919	13921
LESS BALLAST	-140	1447.6	0.0	0.0	-1	-1	-1
LAUNCH ESCAPE SYSTEM	7705	1316.9	0.0	0.0	253	13411	13413

2. The Spacecraft IEM Adapter data on Page 3 represents the basic Adapter structure. For Block I usage the "Stabilizing Structure" shown below must be added.

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENT OF INERTIA (SLUG-FT. <sup>2</sup> )		
		X <sub>a</sub>	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
STABILIZING STRUCTURE (SLA)	75	584.7	0.0	0.0	47	22	22

\*Centers of gravity are in the NASA reference system except that the longitudinal ( $X_a$ ) has an origin 98.7 inches below the Command Module structure mold line.

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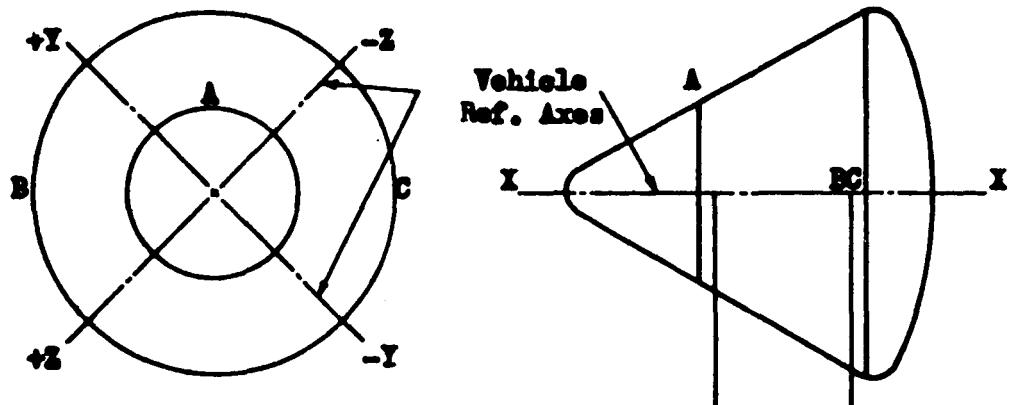
SECTION III

ACTUAL WEIGHT AND BALANCE

SID 63-143-13

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WEIGHT AND BALANCE DATA SHEET

## COMMAND MODULE - HORIZONTAL

FIRST POSITIONVehicle No. B/P #27Recorded By J. A. HughesLocation Downey, CaliforniaDate Performed 8-12-64

## REACTION POINT A - Tension

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Red	12385	-302	12083	
2		12304	-292	12012	
3		12292	-278	12014	
					12036.3

## REACTION POINT B - Compression

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Blue	15147	-298	14849	
2		15150	-297	14853	
3		15128	-278	14850	
					14850.7

## REACTION POINT C - Compression

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1		13055	-299	12756	
2		13107	-294	12813	
3		13091	-274	12817	
					12795.3

VERIFIED BY:

*Horniles*

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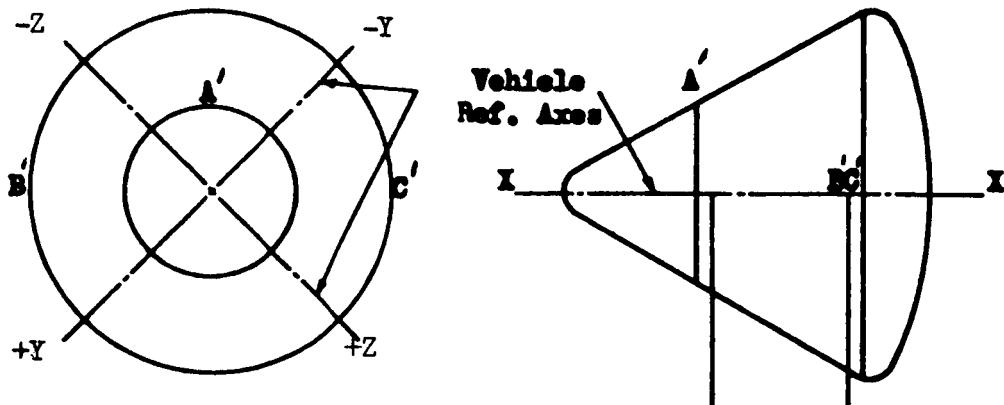
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## WEIGHT AND BALANCE DATA SHEET

## COMMAND MODULE - HORIZONTAL

SECOND POSITIONVehicle No. BP#27Recorded By J. A. HughesLocation Downey, CaliforniaDate Performed 8-12-64

## REACTION POINT A' - Tension

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Red	12327	-255	12072	
2		12341	-294	12047	
3		12348	-296	12052	
					12057.0

## REACTION POINT B' - Compression

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Blue	13080	-247	12833	
2		13137	-297	12840	
3		13135	-300	12835	
					12836.0

## REACTION POINT C' - Compression

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Yellow	15011	-245	14766	
2		15075	-291	14784	
3		15067	-305	14762	
					14770.7

VERIFIED BY:

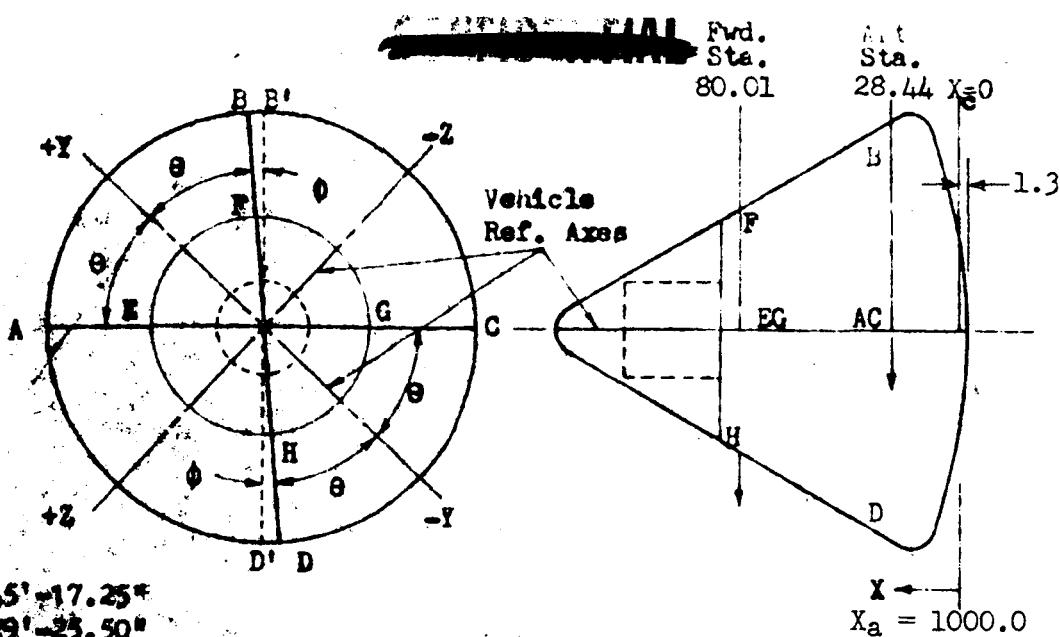
*H. Miller*

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**COMMAND MODULE  
ACTUAL WEIGHT & BALANCE  
BOILERPLATE NO. 27**

Name: J. A. Hughes  
Date: 12 August 1964

DESCRIPTION	C	± CORR.	AVER. RDG.	WEIGHT	LONG	MOM.	LAT	MOM.	VERT	MOM.
(A) Red-Tension Front Jack Position	F		12036.3	3021.3	80.01	241734	3.44	10393		
(A') Red-Tension	G		12057.0	3026.5	80.01	242150			3.44	10411
B) Blue Compression Front Jack Position	A		14850.7	3738.6	28.44	106326	75.64	282788		
B') Blue Compression	B		12836.0	3230.5	28.44	91875			-75.64	-244355
C) Yellow Compression Aft Jack Position	C		12795.3	3223.9	28.44	91688	75.64	-243856		
(C) Yellow Compression	D		14770.7	3722.5	28.44	105868			75.64	281570
First Position	F + A + C		9983.8	44.05	439748	4.94	49325			
<b>GROSS (as weighed)</b>	<b>G + B + D</b>		<b>9979.5</b>	<b>44.08</b>	<b>439893</b>				<b>4.77</b>	<b>47626</b>

Transfer to Vehicle Reference Axes ( L = LAT. ARM, V = VERT. ARM )

$$X = L (\cos \theta - \sin \theta \tan \phi) - V \frac{\sin \theta}{\cos \phi} = .12$$

$$\begin{aligned}\sin \theta &= .67886 \\ \cos \theta &= .73426 \\ \tan \theta &= .92454 \\ \sin \phi &= .07829 \\ \cos \phi &= .99693 \\ \tan \phi &= .07853\end{aligned}$$

$$Z = [L - (V + L \sin \theta) \tan \phi] \sin \theta + (V + L \sin \theta) \frac{\cos \theta}{\cos \phi} = 7.15$$

DESCRIPTION	WEIGHT	X	WX	Y	WY	Z	WZ
<b>TRANSFERRED GROSS (as weighed)</b>	<b>9981.7</b>	<b>44.06</b>	<b>439821</b>	<b>0.12</b>	<b>1198</b>	<b>7.15</b>	<b>71369</b>
<b>Corrections:</b>							
Less - Forward Fittings	-21.2	79.05	-1676	0.0	-	0.0	-
- Aft Fittings	-47.4	28.44	-1348	0.0	-	0.0	-
<b>Net (As Weighed)</b>	<b>9913.1</b>	<b>44.06</b>	<b>436797</b>	<b>0.12</b>	<b>1198</b>	<b>7.20</b>	<b>71369</b>
Plus - Displaced Air Correction	3.0	44.06	132	0.12	-	7.15	21
- Added Ballast (Page 8)	1056.6	35.7	37721	5.8	6128	12.4	-13102
- Paint	16.0	30.0	480	0.0	-	0.0	-
<b>NET (AS MODIFIED)</b>	<b>10988.7</b>	<b>43.24</b>	<b>475130</b>	<b>0.67</b>	<b>7326</b>	<b>5.30</b>	<b>58288</b>

~~CONFIDENTIAL~~CORRECTIONS TO ACTUAL WEIGHT AND BALANCEBOILERPLATE STACK NO. 27COMMAND MODULE

ITEM	REQ.	WEIGHT	CENTER OF GRAVITY		
			X <sub>a</sub>	Y <sub>a</sub>	Z <sub>a</sub>
ADDED BALLAST*		(1056.6)	(35.7)	(5.8)	(-12.4)
B16-301095-5					
-5	1	55.7	1084.3	18.0	-0.6
-5	2	111.2	1081.7	13.2	-11.9
-5	2	111.2	1081.7	0.0	-18.1
-5	1	55.7	1084.3	-11.4	-13.1
-5	1	55.6	1014.0	18.7	45.4
-5	1	55.6	1014.0	41.1	26.5
-5	1	55.6	1014.0	45.9	16.9
-5	1	55.6	1014.0	48.6	5.0
-5	1	55.6	1014.0	48.4	-6.4
-5	1	55.6	1014.0	29.7	-38.8
-5	1	55.6	1014.0	18.6	-45.2
-5	1	55.6	1014.0	2.6	-48.9
-5	1	55.6	1014.0	-8.9	-48.1
-5	1	55.6	1014.0	-29.9	-38.9
-5	1	55.6	1014.0	-40.8	-26.9
-5	1	55.6	1014.0	-48.3	-7.4
B16-301095-5	1	55.6	1014.0	-48.7	4.1

\*THE BALLAST WEIGHTS ARE BASED ON THE ACTUAL AVERAGE WEIGHT AND INCLUDE  
BOLTS, NUTS AND WASHERS

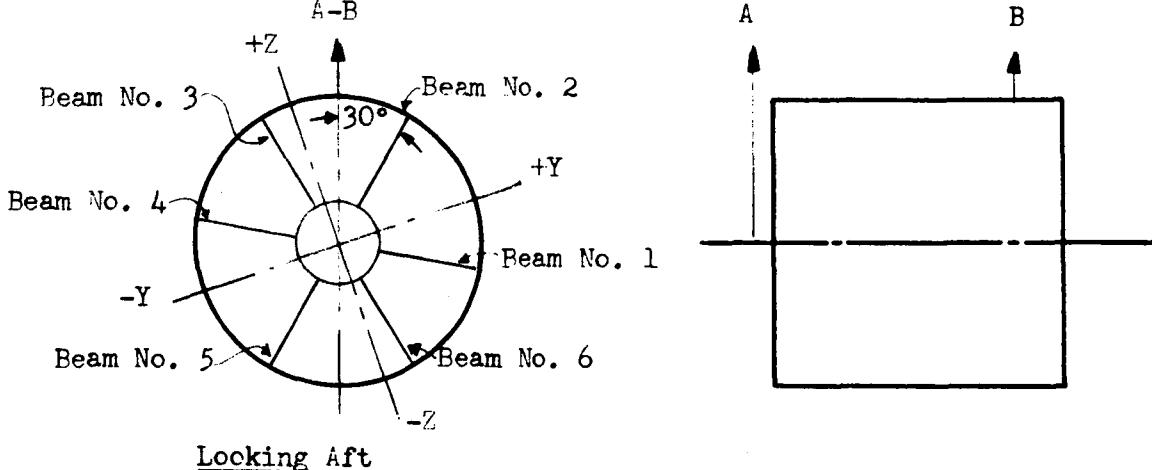
~~CONFIDENTIAL~~WEIGHT AND CENTER OF GRAVITY SUMMARYBOILERPLATE STACK NO. 27COMMAND MODULE

ITEM	WEIGHT	CENTER OF GRAVITY		
		X <sub>a</sub> *	Y <sub>a</sub>	Z <sub>a</sub>
TWO HORIZONTAL WEIGHINGS (Page 7)	10988.7	1043.24	0.67	5.30
COMMAND MODULE	10989	1043.2	0.7	5.3

\*TO TRANPOSE X<sub>c</sub> STATIONS TO X<sub>a</sub> STATIONS ADD  
1000.0 TO THE X<sub>c</sub> STATION. THEREFORE X<sub>c</sub> STATION 43.24  
IS EQUIVALENT TO X<sub>a</sub> = 1000.0 + 43.24 = 1043.24 or 1043.2

## WEIGHT AND BALANCE DATA SHEET

## SERVICE MODULE - HORIZONTAL

Vehicle No. B/P #27Recorded By T. N. HuntLocation Downey, CaliforniaDate Performed 3 October 1964REACTION POINT A

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Red	15544	-300	15244	
2		15561	-300	15261	
3		15546	-300	15246	
					15250.3

REACTION POINT B

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Blue	23616	-300	23316	
2		23602	-300	23302	
3		23632	-300	23332	
					23316.7

## REACTION POINT

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING

VERIFIED BY:

*Hillier*

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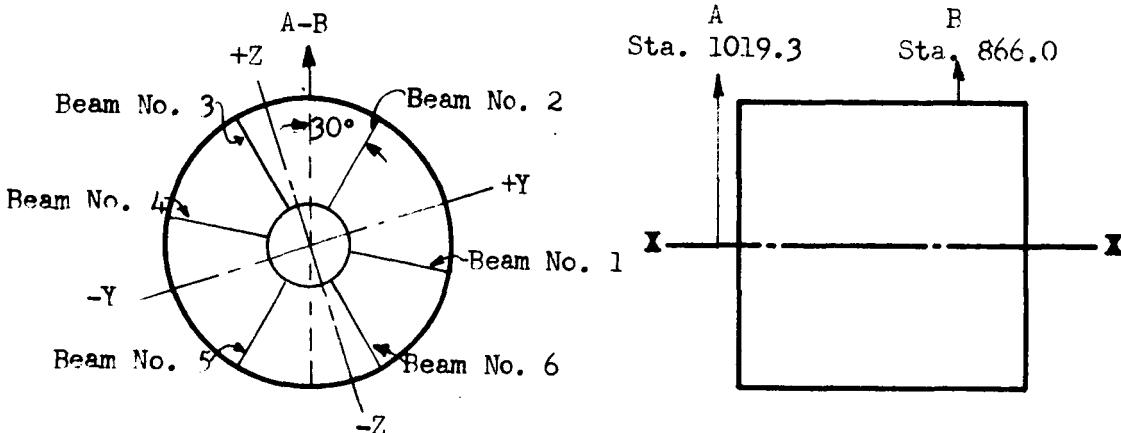
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WEIGHT AND BALANCE CALCULATION SHEET

## SERVICE MODULE - HORIZONTAL

Looking AftVehicle No. P/P #27Recorded By T. N. HuntLocation Downey, CaliforniaDate Performed 3 October 1964

## WEIGHT DERIVATION

REACT POINT	LOAD CELL	AVERAGE READING	INDICATED WEIGHT	BUOYANCY CORRECTION	GRAVITY CORRECTION	WEIGHT
A	Red	15250.3	3826.6	-	-	3826.6
B	Blue	23316.7	5840.2	-	-	5840.2

## WEIGHT AND X CENTER OF GRAVITY

DESCRIPTION	REACT POINT	WEIGHT	X STA	X MOMENT
Cell Location	A	3826.6	1019.3	3900453
Cell Location	B	5840.2	866.0	5057613
GROSS (as weighed)		9666.8	926.8	8958066
LESS - H14-022, Modif.		-1690.0	1011.6	-1709604
- H14-177 Saddle		-191.8	865.9	-166080
CORRECTIONS (Page 12)		344.7	961.8	331532
CORRECTED WEIGHT AND X CG		8129.7	912.0	7413914



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CORRECTIONS TO ACTUAL WEIGHT AND BALANCE

SERVICE MODULE - HORIZONTAL

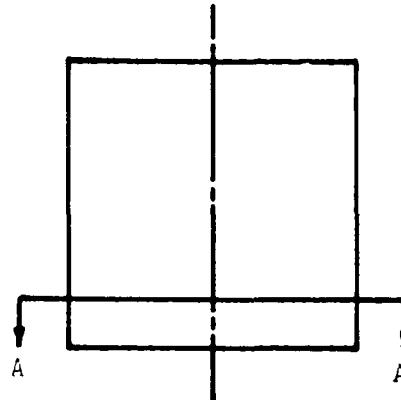
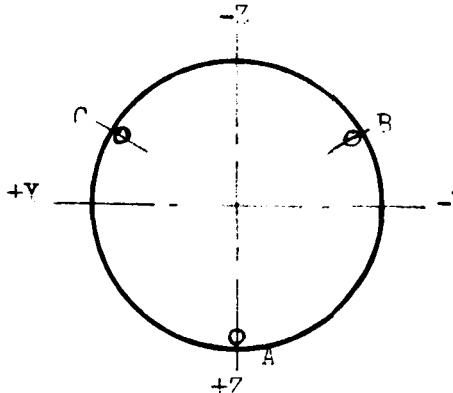
BOILERPLATE NO. 27

ITEM	WEIGHT	CENTER OF GRAVITY
		X <sub>a</sub>
Tension Tie	6.3	999.5
RCS Engines	105.6	958.9
B17-330108 Heat Exchangers	31.0	836.7
B17-330109 Valve	15.0	835.8
B17-320150 Fairing	173.7	1005.2
B17-340107 Line	1.9	836.9
B17-340108 Line	1.7	836.9
B17-340106 Line	0.8	825.7
24396-C24 Elbow	1.7	828.1
MS 24392-D24 Union	0.3	825.7
MS 28741-24-0111 Hose	4.6	828.1
MS 28781-24-0194 Hose	2.1	828.1
TOTAL CORRECTION	+344.7	961.8

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## WEIGHT AND BALANCE DATA SHEET

## SERVICE MODULE - VERTICAL



Section A-A

Vehicle No. B/P #27Recorded By I. A. HughesLocation Downey, CaliforniaDate Performed 9-12-61

## REACTION POINT A

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Red	14964	-291	14673	
2		14962	-295	14667	
3		14970	-295	14675	
					14671.7

## REACTION POINT B

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Yellow	15005	-288	14717	
2		15011	-296	14715	
3		15040	-301	14739	
					14723.7

## REACTION POINT C

DETERMINATION NUMBER	LOAD CELL	GROSS READING	ZERO READING	CORRECTED READING	AVERAGE READING
1	Blue	15265	-295	14970	
2		15275	-298	14977	
3		15270	-298	14972	
					14973.0

VERIFIED BY:

*H. Miller*

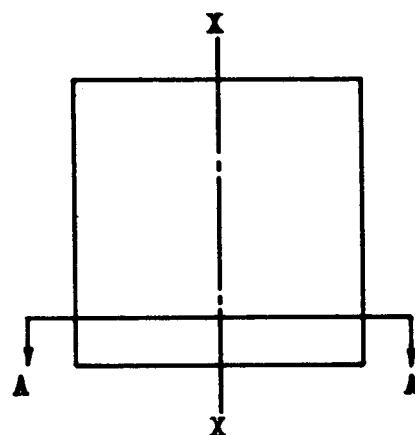
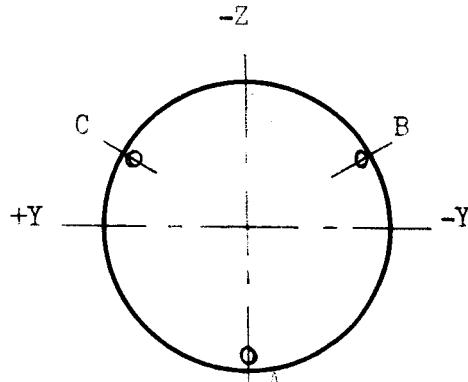
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## WEIGHT AND BALANCE CALCULATION SHEET

## SERVICE MODULE - VERTICAL



Section A-A

Vehicle No. B/P #27 (S/N 12)Recorded By J. A. HughesLocation Downey, CaliforniaDate Performed 9-12-64

## WEIGHT DERIVATION

REACT POINT	LOAD CELL	AVERAGE READING	INDICATED WEIGHT	BUOYANCY CORRECTION	GRAVITY CORRECTION	WEIGHT
A	Red	14671.7	3697.4	-	-	3697.4
B	Yellow	14723.7	3710.7	-	-	3710.7
C	Blue	14973.0	3769.2	-	-	3769.2

## WEIGHT AND Y - Z CENTER OF GRAVITY

DESCRIPTION	REACT POINT	WEIGHT	Y STA	Y MOMENT	Z STA	Z MOMENT
Cell Location	A	3697.4	0.0	-	75.7	279893
Cell Location	B	3710.7	-65.56	-24334.8	-37.85	-140450
Cell Location	C	3769.2	65.56	247184	-37.85	-142664
GROSS (as weighed)		11177.3		3836		-3221
LESS - HL4-030 Support Ring		-4280.1	-0.09	373	-0.40	1714
- Sling Clevis Fittings		-24.6	0.0	-	0.0	-
Net As Weighed		6872.6	0.6	4209	-0.2	-1507
Add - Correction (Page 15)		1283.7	1.7	2146	-1.0	-1263
<b>CORRECTED WEIGHT AND CG (Y-Z)</b>		<b>8156.3</b>	<b>0.78</b>	<b>6355</b>	<b>-0.34</b>	<b>-2770</b>

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CORRECTIONS TO ACTUAL WEIGHT AND BALANCE

SERVICE MODULE - VERTICAL

BOILERPLATE NO. 27

ITEM	WEIGHT (LBS)	CENTER OF GRAVITY	
		Y	Z
Tension Ties	6.3	0.0	0.0
RCS Engines	105.6	0.0	0.0
B17-330108 Heat Exchangers	31.0	11.6	-2.8
B17-330109 Valve	15.0	36.2	33.4
B17-320150 Fairing	173.7	4.9	-7.7
B17-340107 Line	1.9	-48.8	-28.5
B17-340108 Line	1.7	46.9	41.5
B17-340106 Line	0.8	65.7	11.5
24396-C24 Elbow	1.7	46.0	6.0
MS 24392-D24 Union	0.3	56.0	10.0
MS 28741-24-0111 Hose	4.6	7.0	2.0
MS 28741-24-0194 Hose	2.1	-16.0	-55.0
V17-320201-189 Doubler & Bond	9.0	0.0	0.0
V17-331928-3 Plate	1.1	0.0	0.0
V17-331928-5 Plate	1.1	0.0	0.0
B17-330111 SPS Tank - He	873.0	0.0	0.0
B17-330106 Bracket	3.5	50.6	38.3
B17-330107 Bracket	3.3	-45.5	-39.2
B17-330121-3 Plate	0.4	70.5	9.5
B17-340106 Line	0.8	-21.9	-63.5
B17-330122-3 Plate	0.4	-25.0	-68.3
B17-340103 Cover	22.0	0.0	0.0
V17-320201 Bonding	8.4	0.0	0.0
MS 9096-24 Elbow	0.7	-46.0	-6.0
MS 24401-24D Elbow	1.3	38.5	-23.0
MS 24400-D24 Nut	0.3	23.5	-28.0
7000 D24 Socket	5.2	23.5	-28.0
7005-E-24 Nipple	2.8	23.5	-28.0
9202 M4-56 Screw	1.3	0.0	0.0
MS 24392-D24 Union	0.6	5.0	2.0
MS 287-41-24-0200 Hose	2.2	5.0	2.0
MS 9096-24 Elbow	1.4	0.0	0.0
MS 9099 Nut	0.2	-15.3	-2.0
TOTAL CORRECTIONS	+1283.7	1.7	-1.0

~~CONFIDENTIAL~~WEIGHT AND CENTER OF GRAVITY SUMMARYBOILERPLATE STACK NO. 27SERVICE MODULE

ITEM	WEIGHT	CENTER OF GRAVITY		
		Xa	Ya	Za
Horizontal Weighing (Page 11)	8129.7	912.0		
Vertical Weighing (Page 14)	8156.3		0.8	-0.3
SERVICE MODULE AVERAGE	8143.0	912.0	0.8	-0.3

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NORTH AMERICAN AVIATION, INC.

SPACE and INFORMATION SYSTEMS DIVISION



SECTION IV

WEIGHT BREAKDOWN SUMMARIES

SID 63-143-13

WEIGHT BREAKDOWN SUMMARYLAUNCH ESCAPE SYSTEMBOILERPLATE STACK NO. 27

STRUCTURE	966
Tower	279
Escape Motor Skirt	220
Ballast Enclosure	227
Nose Cone	35
Attaching Parts	13
Tower Insulation	182
Skirt Insulation	10
BALLAST AND INSTALLATION PROVISIONS	1516
Ballast - Total Capacity	1500
Provisions	16
PROPELLION	5363
Escape Motor (Inert)	4787
Jettison Motor (Inert)	438
Jettison Motor Skirt	89
Pitch Control Motor (Inert)	49
TOTAL WEIGHT	7845

WEIGHT BREAKDOWN SUMMARYCOMMAND MODULEBOILERPLATE STACK NO. 27

BASIC STRUCTURE

11013

Structure	3951
Ballast	7062

MANUFACTURING VARIATION

-24

TOTAL	10989
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WEIGHT BREAKDOWN SUMMARYSERVICE MODULEBOILERPLATE STACK NO. 27

BASIC STRUCTURE	2194
Basic Body Structure - Center Section	1677
Secondary Structure	313
Separation Provisions and Attach	6
Fairing - Command Module to Service Module	174
Miscellaneous	24
ENVIRONMENTAL CONTROL SYSTEM	45
Water Glycol Circuit	34
Common Items - S&ID	11
ELECTRICAL POWER SYSTEM	1794
Power Source - Fuel Cell	1792
Electrical Provisions	2
MAIN PROPULSION SYSTEM	2918
Fuel System	616
Oxidizer System	690
Pressurization System	921
Engine System	691
REACTION CONTROL SYSTEM	1174
Fuel System	321
Oxidizer System	597
Pressurization System	21
Engine System	165
Structural Provisions	70
MANUFACTURING VARIATIONS	18
TOTAL	8143

WEIGHT BREAKDOWN SUMMARYSPACECRAFT LEM ADAPTERBOILERPLATE STACK NO. 27

## STRUCTURE

Basic Structure	3149
Ballast	426
TOTAL	3575

NORTH AMERICAN AVIATION, INC.



SPACE and INFORMATION SYSTEMS DIVISION

SECTION V

REMOVABLE ITEMS

SID 63-143-13

REMOVABLE ITEMSLAUNCH ESCAPE SYSTEMBOILERPLATE STACK NO. 27

ITEM	NO REQ	WEIGHT	CENTERS OF GRAVITY*
			X <sub>a</sub>
V15-300411 - 3 Ballast	1	100	1436.0
V15-300411 - 5 Ballast	1	100	1437.0
V15-300411 - 5 Ballast	1	100	1437.8
V15-300411 - 5 Ballast	1	100	1438.6
V15-300411 - 5 Ballast	1	100	1439.4
V15-300411 - 5 Ballast	1	100	1440.2
V15-300411 - 5 Ballast	1	100	1441.0
V15-300411 - 5 Ballast	1	100	1441.8
V15-300411 - 5 Ballast	1	100	1442.6
V15-300411 - 5 Ballast	1	100	1443.4
V15-300411 - 5 Ballast	1	100	1444.2
V15-300411 - 5 Ballast	1	100	1445.0
V15-300411 - 5 Ballast	1	100	1445.8
V15-300411 - 7 Ballast	1	40	1446.5
V15-300411 - 7 Ballast	1	40	1447.1
V15-300411 - 7 Ballast	1	40	1447.7
V15-300411 - 7 Ballast	1	40	1448.3
V15-300411 - 7 Ballast	1	40	1448.9

- NOTES:
1. The Ballast weight shown above indicate nominal weights for a maximum total of 1500 pounds. The Y and Z centers of gravity are 0.0.
  2. V15-300411-3 Ballast is always on the bottom of the stack, and runs from station (X<sub>a</sub>) = 1435.5 to 1436.6.
  3. V15-300411-5 Ballast (12 pieces) are 0.8 inches thick each. In the maximum stack they run from station (X<sub>a</sub>) = 1436.6 to 1446.2.
  4. V15-300411-7 Ballast (5 pieces) are 0.6 inches thick each. In the maximum stack they run from station (X<sub>a</sub>) = 1446.2 to 1449.2.
  5. For any variation in the Ballast requirements be sure to allow for a moment change of the remaining V15-300411-7 pieces when V15-300411-5's have been removed.

\*Centers of gravity are in the NASA Reference system except that the longitudinal (X<sub>a</sub>) has an origin 998.7 inches below the Command Module structure mold line.

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~~CONFIDENTIAL~~REMOVABLE ITEMSCOMMAND MODULEBOILERPLATE STACK NO. 27

ITEM	NO REQ	WEIGHT	CENTERS OF GRAVITY*		
			Xa	Y	Z
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	-11.8	-56.3
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	-28.0	-50.1
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	-55.0	-16.9
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	-57.7	0.0
B16-301095 - 8 Weight	1	27.3	1042.9	-55.1	17.1
B16-301095 - 8 Weight	1	27.3	1042.9	-51.2	26.4
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	-28.7	49.8
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1042.9	-20.9	53.5
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	-12.6	56.0
B16-301095 - 7 Weight	1	27.3	1042.9	-4.0	57.3
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	12.8	56.0
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	25.4	51.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	51.9	25.1
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1042.9	55.1	17.1
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	57.1	-8.6
B16-301095 - 7 Weight	1	27.3	1042.9	28.2	-50.0
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1042.9	4.8	-57.2
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1032.9	-11.6	-55.2
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1032.9	-27.6	-49.4
B16-301095 - 7 Weight	1	27.3	1032.9	-54.2	-16.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1032.9	-56.9	0.0
B16-301095 - 8 Weight	1	27.3	1032.9	-54.2	16.9
B16-301095 - 8 Weight	1	27.3	1032.9	-50.4	26.0
B16-301095 - 8 Weight	1	27.3	1032.9	-46.9	31.8
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1032.9	-28.2	29.0
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1032.9	-20.5	52.6
B16-301095 - 7 Weight	1	27.3	1032.9	-4.0	56.3
B16-301095 - 8 Weight	1	27.3	1032.9	25.4	50.8
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1032.9	31.4	47.0
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1032.9	51.0	24.8
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1032.9	54.2	16.8
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1032.9	56.8	-8.4
B16-301095 - 8 Weight	1	27.3	1032.9	47.0	-31.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1032.9	12.6	-55.2
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1022.0	-11.5	-54.5
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1022.0	-27.0	-48.5
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1022.0	-53.2	-16.3

\*Centers of gravity are in the NASA Reference system except that the longitudinal (Xa) has an origin 998.7 inches below the Command Module structure mold line.

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~~CONFIDENTIAL~~REMOVABLE ITEMS (CONT.)COMMAND MODULEBOILERPLATE STACK NO. 27

ITEM	NO REQ	WEIGHT	CENTERS OF GRAVITY*		
			Xa	Y	Z
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1022.0	-55.7	0.0
B16-301095 - 8 Weight	1	27.3	1022.0	-53.2	16.5
B16-301095 - 8 Weight	1	27.3	1022.0	-49.5	25.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1022.0	-27.8	48.2
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1022.0	-20.1	51.8
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1022.0	-4.0	55.3
B16-301095 - 8 Weight	1	27.3	1022.0	4.4	55.4
B16-301095 - 7 Weight	1	27.3	1022.0	17.6	52.8
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1022.0	50.1	24.3
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1022.0	53.3	16.4
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1022.0	63.1	-8.3
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1022.0	12.5	-54.3
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1055.9	-43.6	-29.5
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	-47.7	-22.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	-52.3	-7.8
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	-52.3	0.8
B16-301095 - 12 Weight	1	25.6	1055.9	-50.5	15.7
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1055.9	-33.0	41.1
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	-26.4	45.6
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1055.9	-19.0	49.4
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	-11.5	51.4
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1055.9	-3.8	52.5
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	4.2	52.5
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1055.9	43.6	29.7
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	47.5	23.0
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1055.9	50.5	15.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	52.3	8.0
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1055.9	52.9	0.0
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	52.3	-7.8
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1055.9	32.8	-41.2
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1055.9	25.8	-45.9
B16-301095 - 7 Weight	1	27.3	1062.8	-43.7	-20.7
B16-301095 - 7 Weight	1	27.3	1062.8	-46.2	-14.2
B16-301095 - 7 Weight	1	27.3	1062.8	-47.8	-7.1
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1062.8	-47.8	9.3
B16-301095 - 12 Weight	1	25.6	1062.8	-46.1	14.3
B16-301095 - 7 Weight	1	27.3	1062.8	-35.4	32.7
B16-301095 - 11 Weight	1	25.6	1062.8	-30.5	37.6

\*Centers of gravity are in the NASA Reference System except that the longitudinal (Xa) has an origin 998.7 inches below the Command Module structure mold line.

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REMOVABLE ITEMS (CONT.)

COMMAND MODULEBOILERPLATE STACK NO. 27

ITEM	NO REQ	WEIGHT	CENTERS OF GRAVITY*		
			Xa	Y	Z
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1062.8	-24.0	41.7
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1062.8	-17.5	44.9
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1062.8	-6.3	47.0
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1062.8	-3.5	48.0
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1062.8	3.8	47.9
B16-301095 - 7 Weight	1	27.3	1062.8	35.5	32.7
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1062.8	43.5	21.0
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1062.8	46.1	14.3
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1062.8	47.7	7.3
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1062.8	48.3	0.0
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1062.8	47.7	-7.1
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1062.8	30.0	-37.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1062.8	23.5	-42.0
B16-301095 - 7 Weight	1	27.3	1062.8	-35.5	-32.5
B16-301095 - 7 Weight	1	27.3	1069.9	-32.1	-29.5
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1069.9	-39.6	-18.7
B16-301095 - 7 Weight	1	27.3	1069.9	-41.8	-13.8
B16-301095 - 7 Weight	1	27.3	1069.9	-43.2	-6.5
B16-301095 - 7 Weight	1	27.3	1069.9	-43.8	0.0
B16-301095 - 7 Weight	1	27.3	1069.9	-43.3	6.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1069.9	-37.8	21.8
B16-301095 - 7 Weight	1	27.3	1069.9	-32.1	29.5
B16-301095 - 8 Weight	1	27.3	1069.9	-21.8	37.8
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1069.9	-15.8	40.6
B16-301095 - 12 Weight	1	25.6	1069.9	-3.1	43.5
B16-301095 - 8 Weight	1	27.3	1069.9	3.5	43.5
B16-301095 - 7 Weight	1	27.3	1069.9	32.1	29.6
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1069.9	39.3	19.0
B16-301095 - 7 Weight, - 8 OPP.	2	54.5	1069.9	43.3	6.5
B16-301095 - 8 Weight	1	27.3	1069.9	43.2	-6.5
B16-301095 - 8 Weight	1	27.3	1069.9	41.8	-12.7
B16-301095 - 3 Weight, - 4 OPP.	2	40.0	1076.1	-36.5	-17.3
B16-301095 - 3 Weight	1	20.0	1076.1	-20.1	34.9
B16-301095 - 3 Weight, - 4 OPP.	2	40.0	1076.1	-14.6	37.6
B16-301095 - 3 Weight, - 4 OPP.	2	40.0	1076.1	-2.9	40.3
B16-301095 - 4 Weight	1	20.0	1076.1	3.2	40.2
B16-301095 - 3 Weight, - 4 OPP.	2	40.0	1076.1	36.3	15.6

\*Centers of gravity are in the NASA Reference system except that the longitudinal (Xa) has an origin 998.7 inches below the Command Module structure mold line.

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~~CONFIDENTIAL~~REMOVABLE ITEMS (CONT.)COMMAND MODULEBOILERPLATE STACK NO. 27

ITEM	NO REQ	WEIGHT	CENTERS OF GRAVITY*		
			Xa	Y	Z
B16-301095 - 3 Weight, - 4 OPP.	2	40.0	1076.1	40.4	0.0
B16-301095 - 4 Weight	1	20.0	1076.1	39.9	-6.0
B16-301095 - 3 Weight, - 4 OPP.	2	40.0	1076.1	19.7	-35.1
B16-301095 - 4 Weight	1	20.0	1056.4	-38.8	35.7
B16-301095 - 4 Weight	1	20.0	1056.4	38.7	35.8
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1062.3	28.0	39.3
B16-301095 - 9 Weight	2	131.2	1029.8	-41.0	-37.5
B16-301095 - 9 Weight	2	131.2	1029.8	-40.9	37.7
B16-301095 - 9 Weight	2	131.2	1029.8	-12.2	54.1
B16-301095 - 9 Weight	2	131.2	1029.8	12.5	54.2
B16-301095 - 9 Weight	2	131.2	1029.8	40.9	37.7
B16-301095 - 9 Weight	2	131.2	1029.8	41.0	-37.6
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1030.9	-35.4	44.2
B16-301095 - 11 Weight, - 12 OPP.	2	51.2	1030.9	46.0	31.4
B16-301095 - 5 Ballast	1	55.7	1084.3	18.0	-0.6
B16-301095 - 5 Ballast	2	111.2	1081.7	13.2	-11.9
B16-301095 - 5 Ballast	2	111.2	1081.7	0.0	-18.1
B16-301095 - 13 Ballast	1	55.7	1084.3	-11.4	-13.1
B16-301095 - 5 Ballast	1	55.6	1014.0	18.7	45.4
B16-301095 - 5 Ballast	1	55.6	1014.0	41.1	26.5
B16-301095 - 5 Ballast	1	55.6	1014.0	45.9	16.9
B16-301095 - 5 Ballast	1	55.6	1014.0	48.6	5.0
B16-301095 - 5 Ballast	1	55.6	1014.0	48.4	-6.4
B16-301095 - 5 Ballast	1	55.6	1014.0	29.7	-38.8
B16-301095 - 5 Ballast	1	55.6	1014.0	18.6	-45.2
B16-301095 - 5 Ballast	1	55.6	1014.0	2.6	-48.9
B16-301095 - 5 Ballast	1	55.6	1014.0	-8.9	-48.1
B16-301095 - 5 Ballast	1	55.6	1014.0	-29.9	-38.9
B16-301095 - 5 Ballast	1	55.6	1014.0	-40.8	-26.9
B16-301095 - 5 Ballast	1	55.6	1014.0	-48.3	-7.4
B16-301095 - 5 Ballast	1	55.6	1014.0	-48.7	4.1

\*Centers of gravity are in the NASA Reference system except that the longitudinal (Xa) has an origin 998.7 inches below the Command Module Structure mold line.

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REMOVABLE ITEMSSERVICE MODULEBOILERPLATE STACK NO. 27

ITEM	NO. REQ.	WEIGHT	CENTERS OF GRAVITY*		
			Xa	Y	Z
B17-330111 SPS Helium Tank	1	436.5	924.5	0.0	0.0
B17-330111 SPS Helium Tank	1	436.5	967.5	0.0	0.0
B17-330112 Tank Dummy Oxygen	1	404.8	970.7	23.0	-29.7
B17-330112 Tank Dummy Oxygen	1	404.8	895.3	23.0	-29.7
B17-330113 Tank Dummy Hydrogen	1	98.0	933.0	42.4	-42.4
B17-330113 Tank Dummy Hydrogen	1	98.0	858.0	42.4	-42.4
B17-330116 Tank RCS Oxidizer	1	146.9	979.5	-6.0	73.0
B17-330116 Tank RCS Oxidizer	1	146.9	979.5	6.0	-73.0
B17-330116 Tank RCS Oxidizer	1	146.9	938.3	-69.5	25.0
B17-330116 Tank RCS Oxidizer	1	146.9	938.3	69.5	-25.0
B17-330117 Tank RCS Fuel	1	77.9	979.5	-6.0	73.0
B17-330117 Tank RCS Fuel	1	77.9	979.5	6.0	-73.0
B17-330117 Tank RCS Fuel	1	77.9	938.3	-69.5	25.0
B17-330117 Tank RCS Fuel	1	77.9	938.3	69.5	-25.0
B17-330118 Tank RCS Helium	1	5.0	958.9	-6.0	73.0
B17-330118 Tank RCS Helium	1	5.0	958.9	6.0	-73.0
B17-330118 Tank RCS Helium	1	5.0	958.9	-69.5	25.0
B17-330118 Tank RCS Helium	1	5.0	958.9	69.5	-25.0
B17-330119 Elec. Power Supply	1	241.5	860.5	-24.2	31.3
B17-330119 Elec. Power Supply	1	241.5	860.5	-47.4	40.8
B17-330119 Elec. Power Supply	1	241.5	860.5	-27.6	56.1
B17-330108 Heat Exchanger	1	15.5	836.7	54.4	35.1
B17-330108 Heat Exchanger	1	15.5	836.7	-31.3	-40.7
B17-330109 Valve	1	15.0	835.8	36.2	33.4
B17-340101 SPS Oxidizer Tank	1	332.0	908.0	-48.3	-6.6
B17-340101 SPS Oxidizer Tank	1	332.0	908.0	48.3	6.6
B17-340102 SPS Fuel Tank	1	287.5	909.9	-14.8	-47.8
B17-340102 SPS Fuel Tank	1	287.5	909.9	14.8	47.8
B17-430003 RCS Engine Cluster	1	26.4	958.9	10.5	80.5
B17-430003 RCS Engine Cluster	1	26.4	958.9	-10.5	-80.5
B17-430003 RCS Engine Cluster	1	26.4	958.9	-80.5	10.5
B17-430003 RCS Engine Cluster	1	26.4	958.9	80.5	-10.5
B17-330100 SPS Engine (Includes following ballast)	1	690.9	826.6	0.0	0.3
B17-330100-11 Ballast	1	7.7	830.3	-2.0	-7.3
B17-330100-11 Ballast	1	7.7	830.3	-2.0	8.4
B16-301095-5 Ballast	1	55.6	832.6	-2.2	0.6
B16-301095-5 Ballast	1	55.6	827.6	1.3	6.3
B16-301095-5 Ballast	1	55.6	827.6	1.3	-4.5
B16-301095-5 Ballast	1	55.6	827.6	-1.3	6.3

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~~CONFIDENTIAL~~REMOVABLE ITEMSSERVICE MODULEBOILERPLATE STACK NO. 27

ITEM	NO. REQ.	WEIGHT	CENTERS OF GRAVITY*		
			Xa	Y	Z
B17-330100 SPS Engine (Includes following ballast) (Continued)					
B16-301095-5 Ballast	1	55.6	827.6	-1.3	-4.5
B16-301095-5 Ballast	1	55.6	823.4	1.3	6.3
B16-301095-5 Ballast	1	55.6	823.4	1.3	-4.5
B16-301095-5 Ballast	1	55.6	823.4	-1.3	6.3
B16-301095-5 Ballast	1	55.6	823.4	-1.3	-4.5

\* Centers of gravity are in the NASA reference system except that the longitudinal (Xa) has an origin 998.7 inches below the command module structure mold line.

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**SECTION VI**  
**WEIGHT DISTRIBUTION**

**SD 63-143-13**

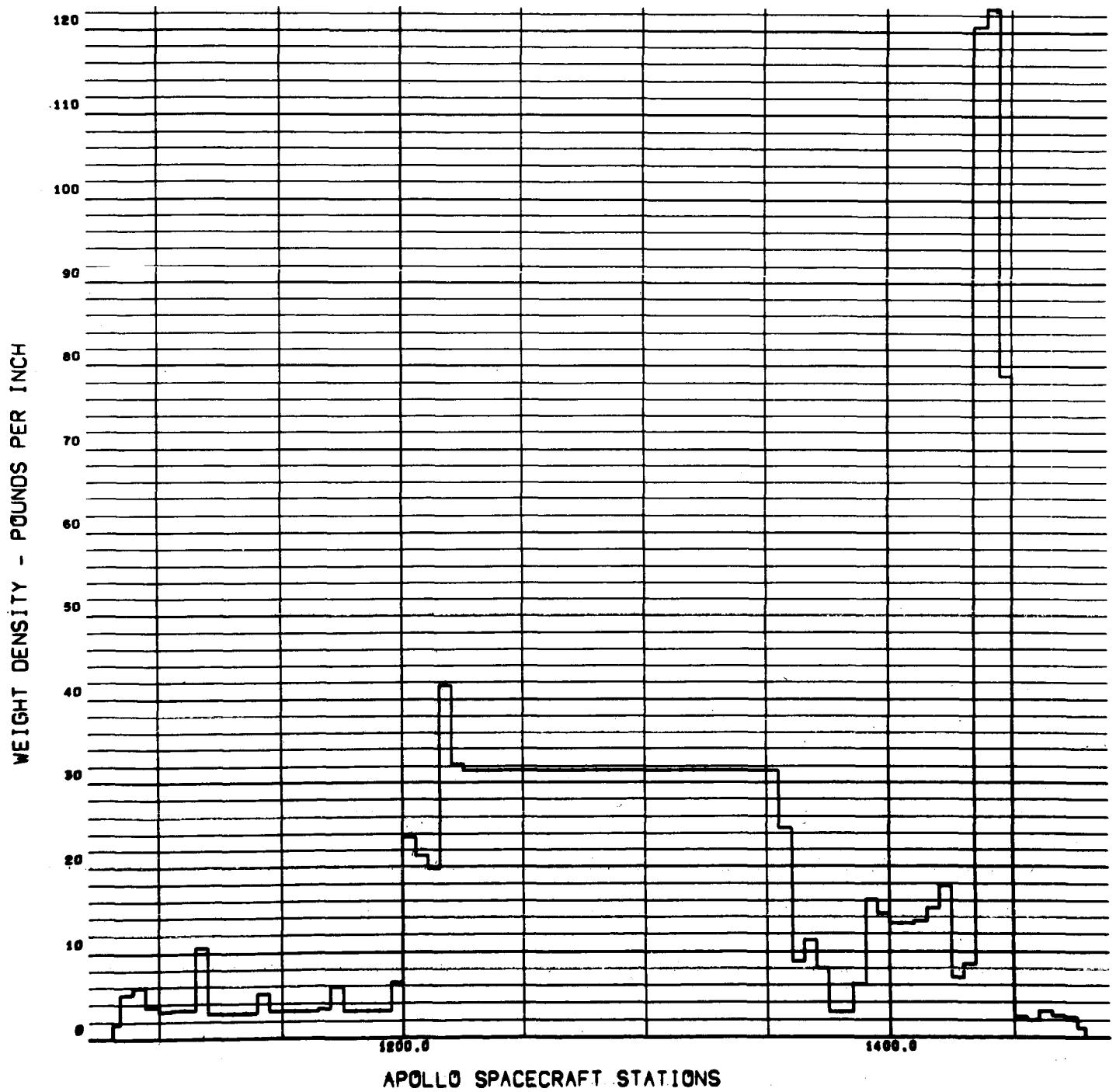


LAUNCH ESCAPE SYSTEM

GROSS WEIGHT

V15 2 16

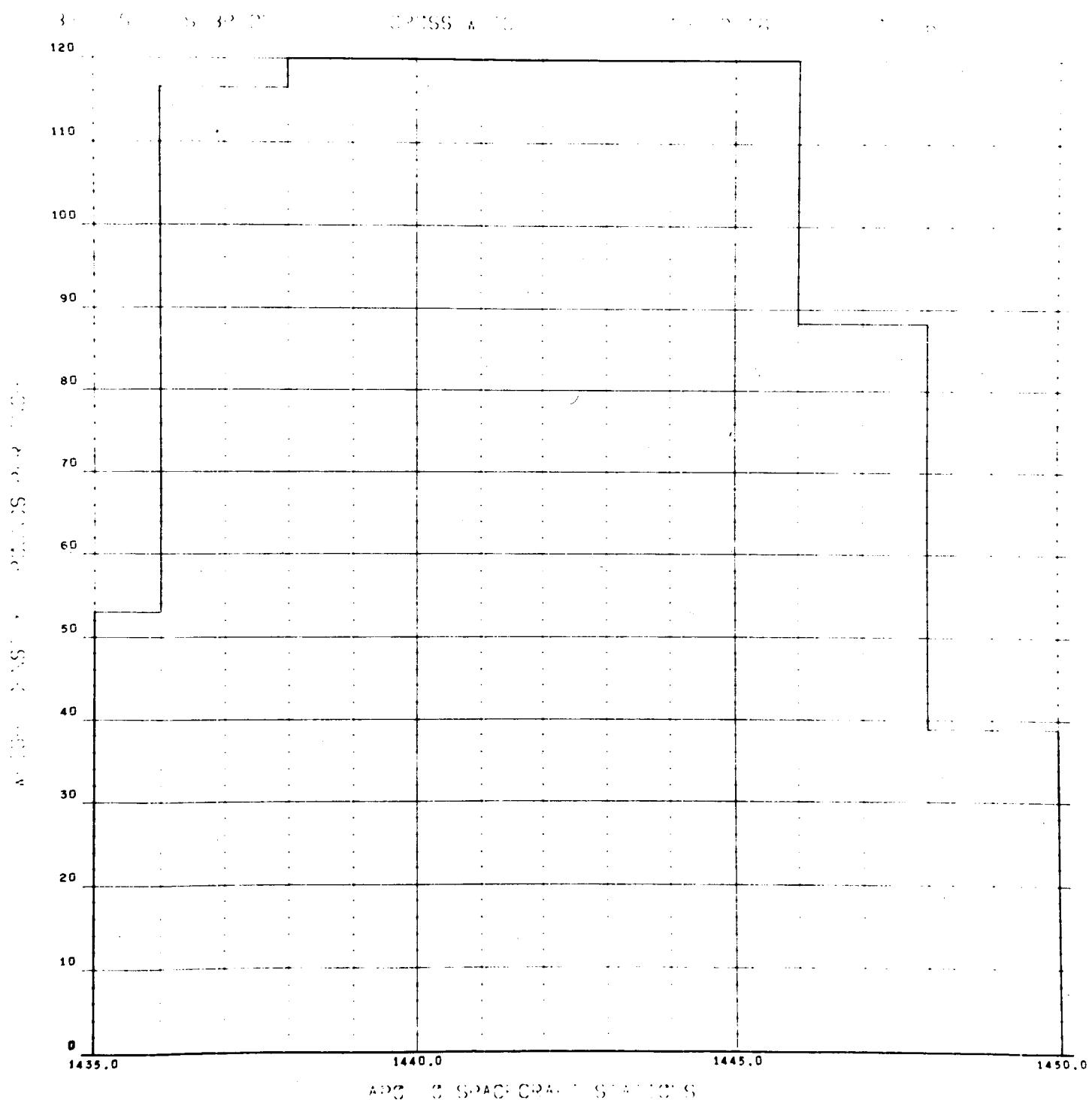
28 SEP 64

0623-46  
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## **SPACE and INFORMATION SYSTEMS DIVISION**



### APG - 3 SPACERAD STATIONS

SID 63-143-13

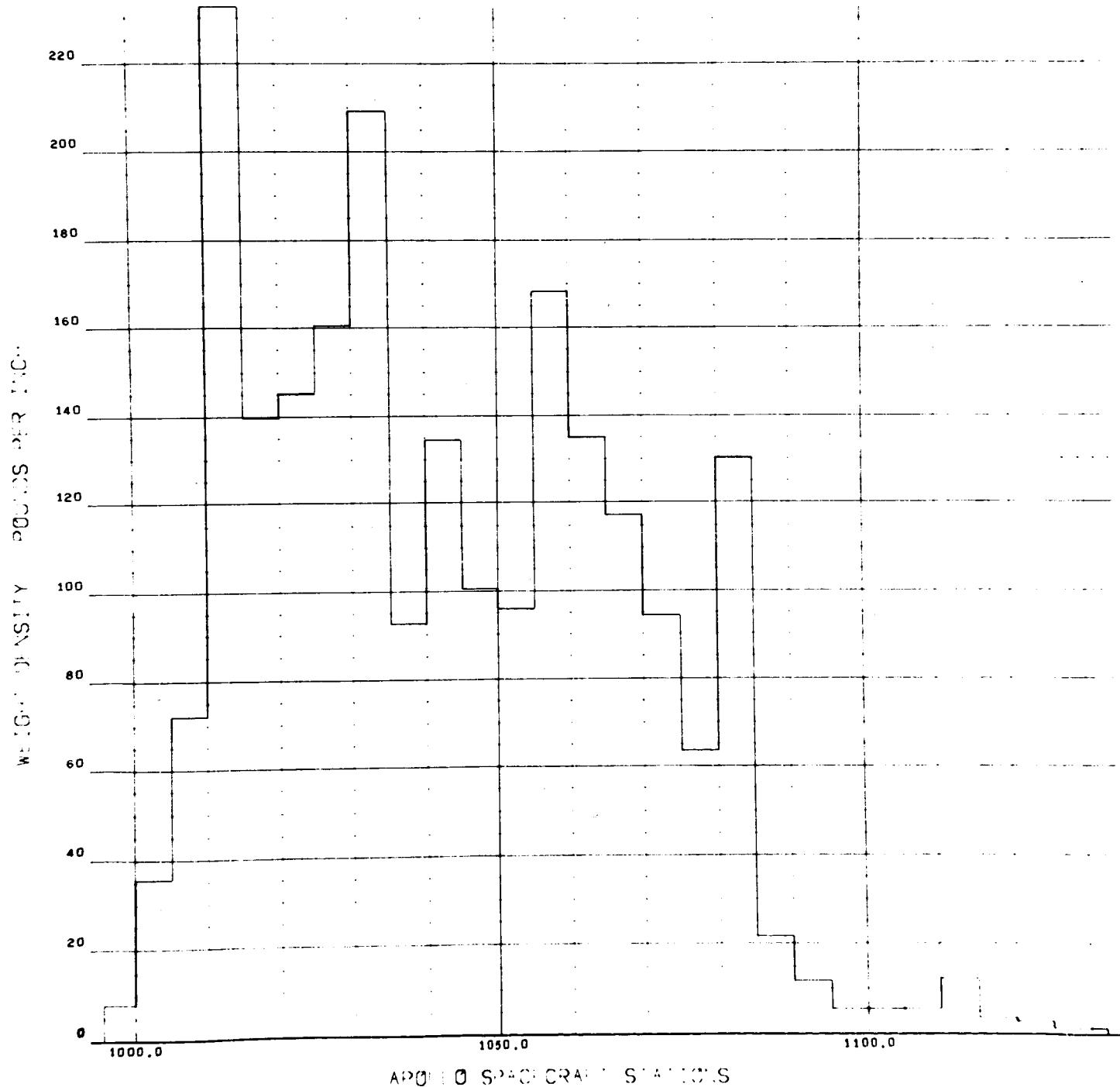


COMMAND MODULE

GROSS WEIGHT

116 2 21

26 OCT 64



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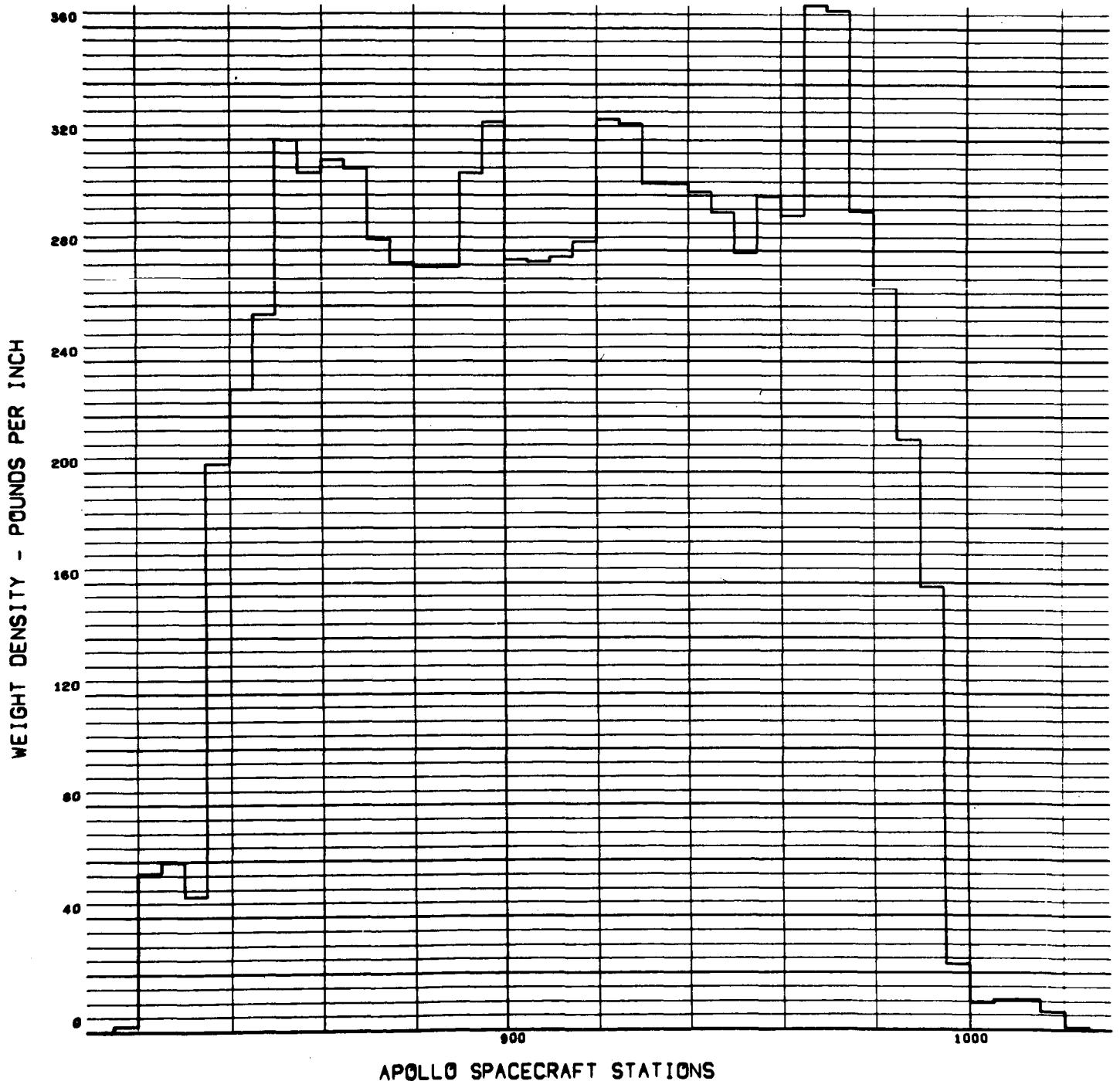
SERVICE MODULE

GROSS WEIGHT

V17 2 12

26 OCT 64

0623-27  
001 000 L

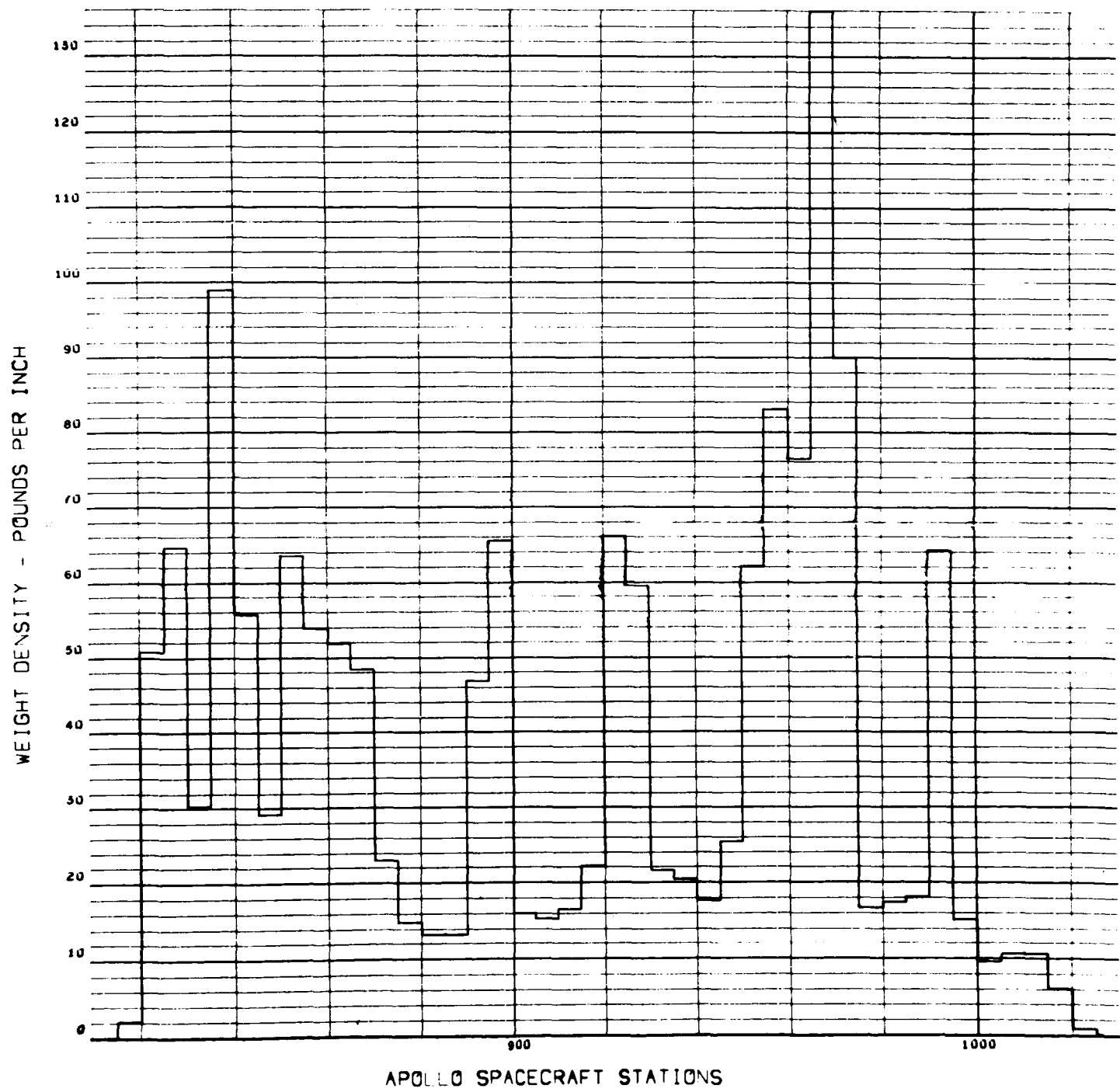


SERVICE MODULE

WEIGHT EMPTY

V17 2 12

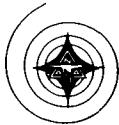
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BALLAST - FUEL TNK

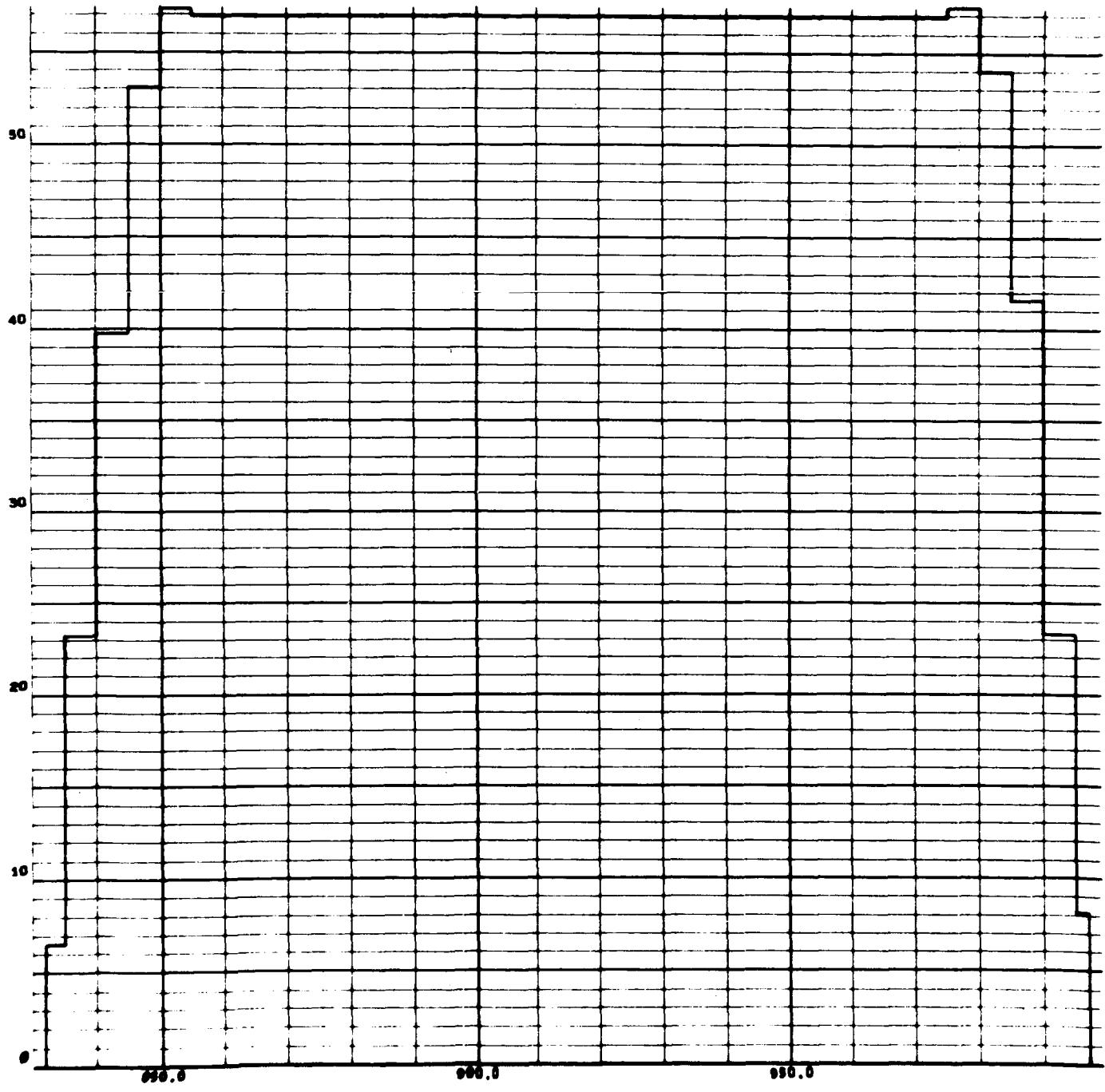
GROSS WEIGHT

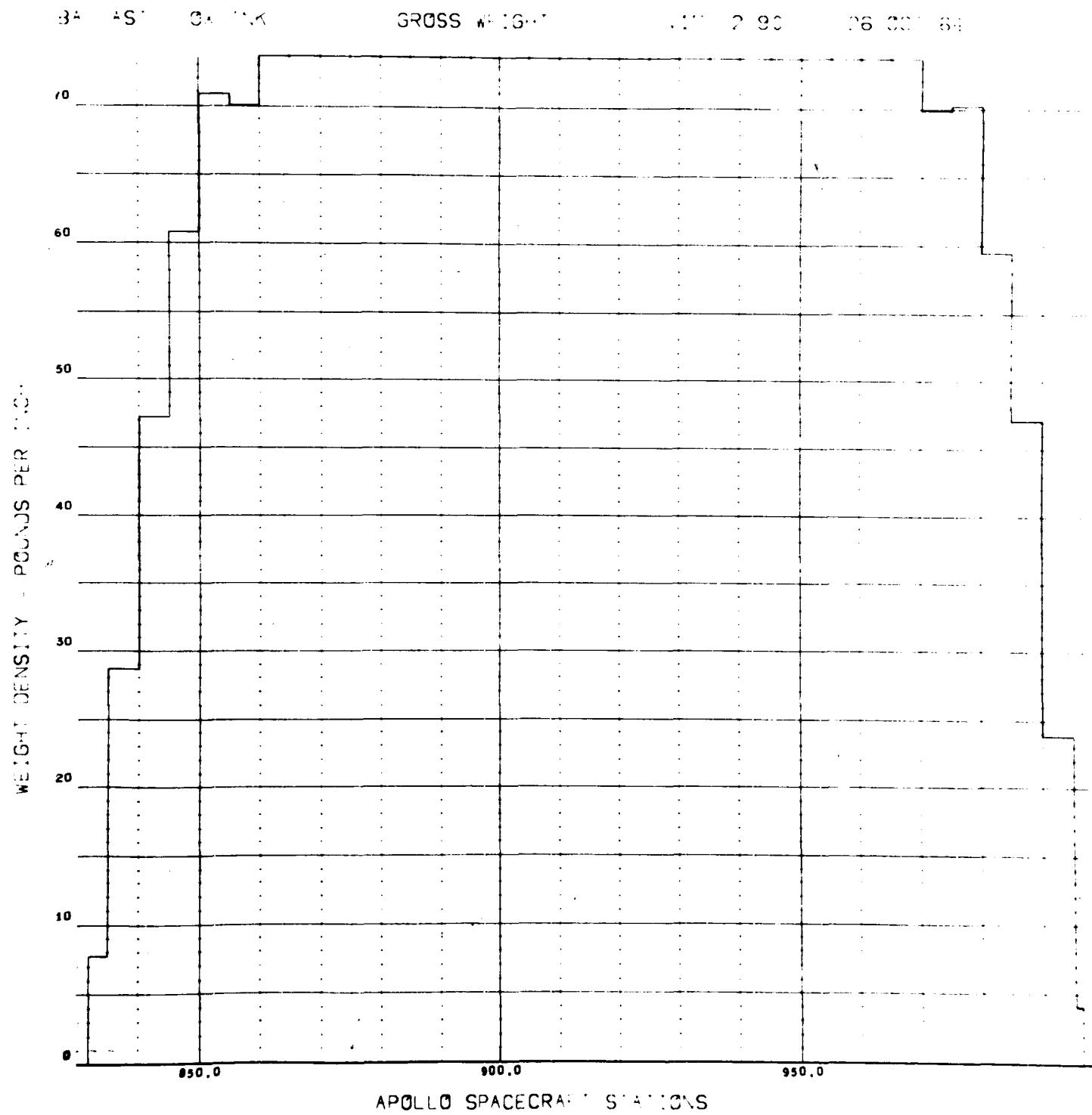
V17 2 93

19 OCT 64

0623-09  
002 000 L

WEIGHT DENSITY - POUNDS PER INCH

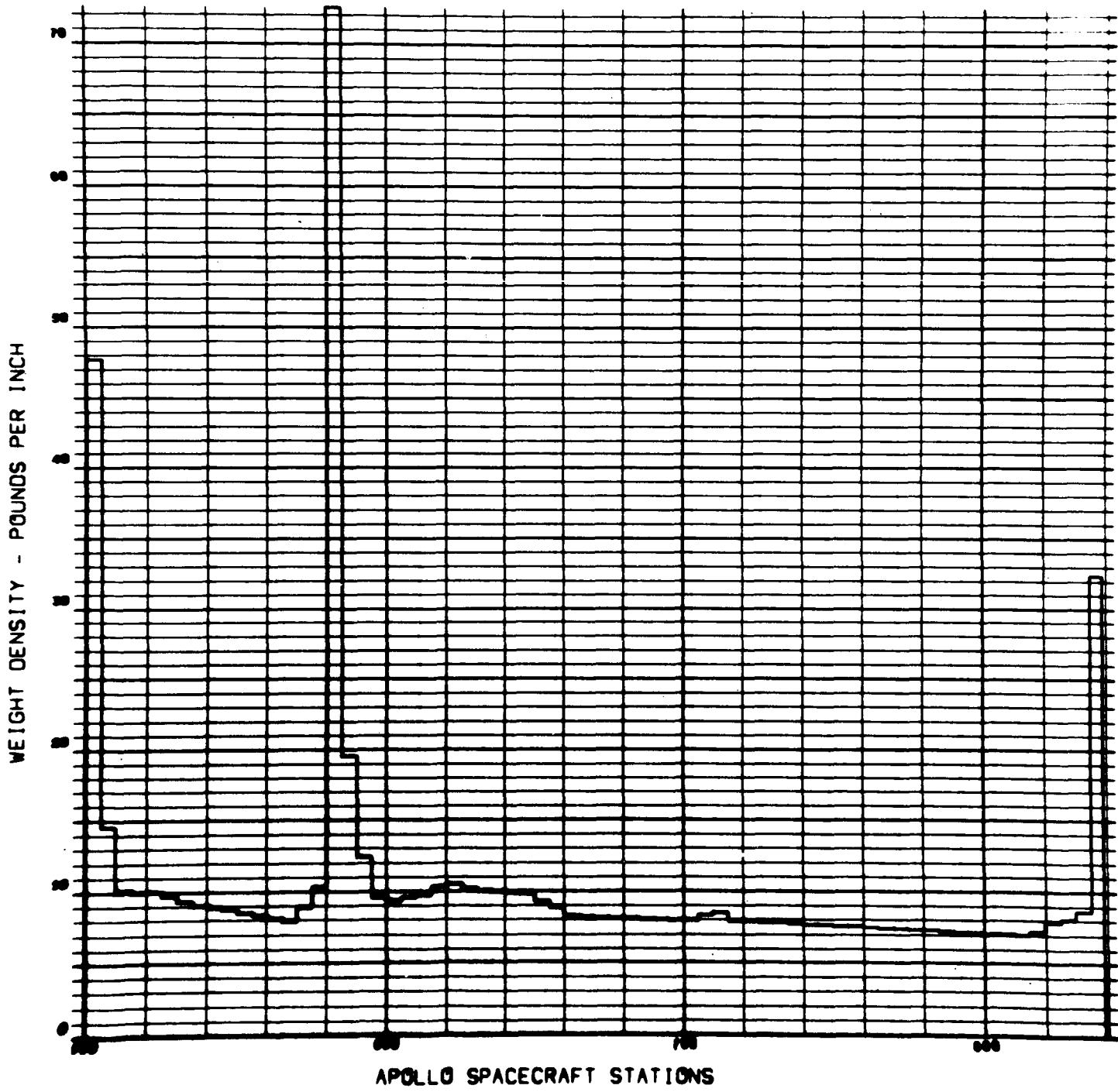






SPACECRAFT LEM ADAPTER

WEIGHT DISTRIBUTION RUN 5 NOV 1964

6703-3/  
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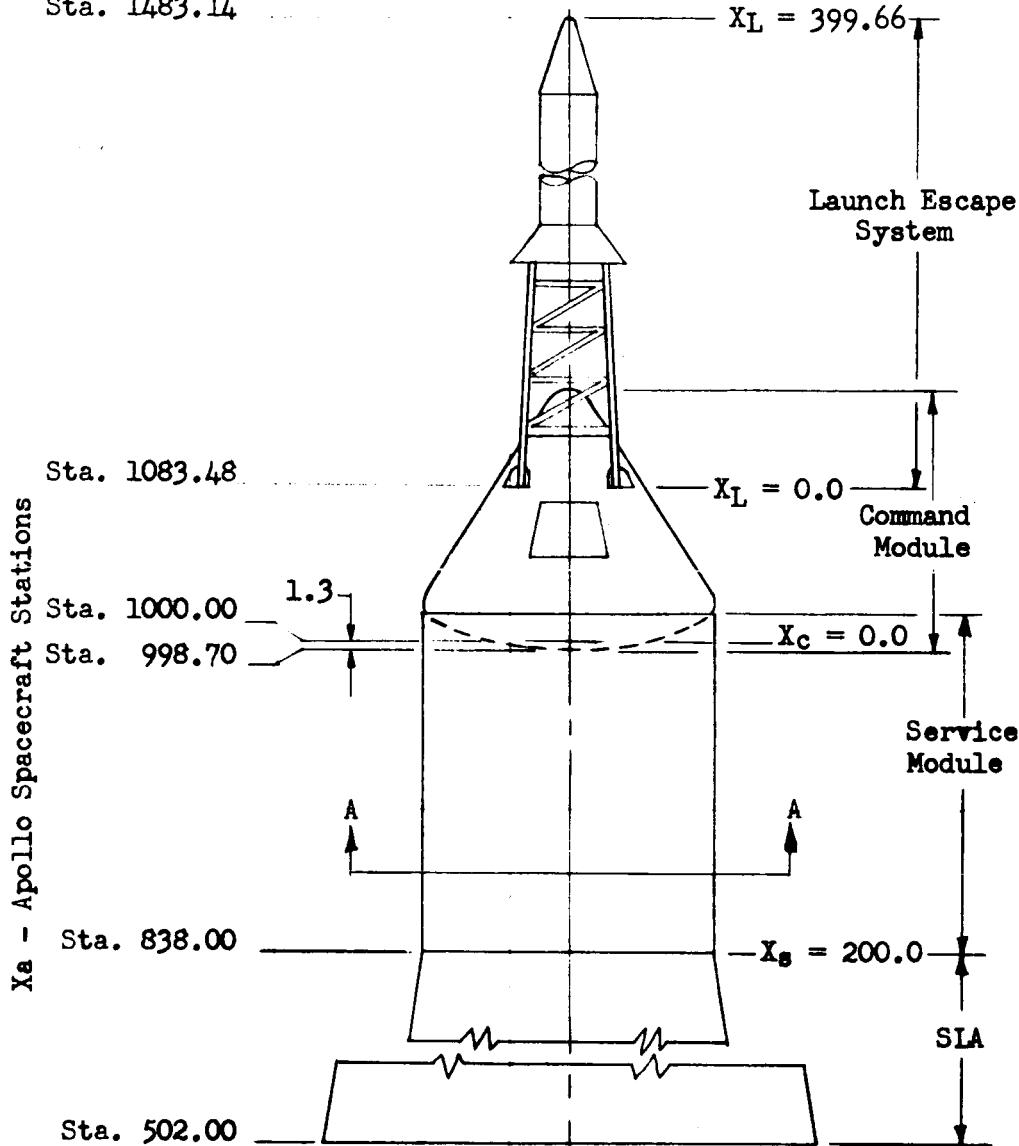
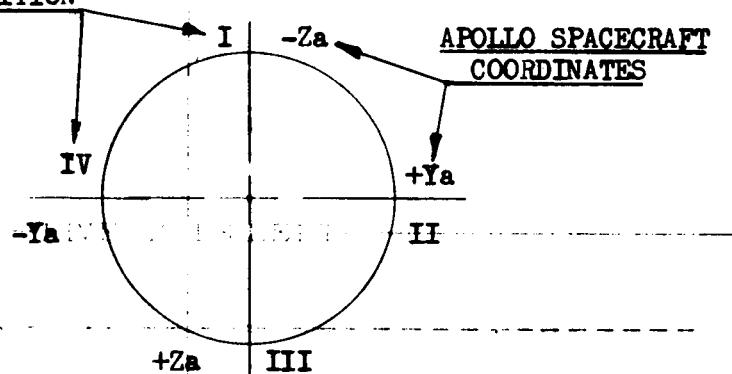
**SECTION VII**  
**DIMENSIONAL DIAGRAM**

**SD 63-143-13**

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BOILERPLATE STACK NO. 27  
DIMENSIONAL DIAGRAM

Sta. 1483.14

SATURN BOOSTER POSITION

Section A-A

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## TECHNICAL REPORT INDEX/ABSTRACT

ACCESSION NUMBER					DOCUMENT SECURITY CLASSIFICATION <del>CONFIDENTIAL</del>	
TITLE OF DOCUMENT						LIBRARY USE ONLY
Actual Weight and Balance Report Boilerplate Stack No. 27 Second Vehicle for Dynamic Test						
AUTHOR(S) Hughes, J. A.						
CODE	ORIGINATING AGENCY AND OTHER SOURCES NAA - S&ID				DOCUMENT NUMBER SID 63-143-13	
PUBLICATION DATE 30 October 1964		CONTRACT NUMBER NAS 9-150				
DESCRIPTIVE TERMS						

## ABSTRACT

The actual weight and balance report is a contractual requirement for the Boilerplate and Airframe stacks. The data presented here is in agreement with requirements as set forth at the BP 27 DEI on 17 September 1964. The Launch Escape System represents the Block I configuration less the booster cover installation and the Command Module is ballasted to the Block I control weight. The Service Module weight is based on the final configuration as weighed without water ballast. The SLA weight is based on the 1 November status less propellant dispersal system and represents a predicted ballast arrangement to meet that total weight. The Launch Escape System and the SLA configuration data are based on calculated values. The Command Module and Service Module data are derived from the actual weighing of the individual modules.